Operating instructions

JAW CRUSHER

PULVERISETTE 1 premium line

Valid starting with: 01.10XX/0001

Valid starting with: 01.20XX/0001

Read the instructions prior to performing any task!

Translation of the original operating instructions

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Certifications and CE conformity

Certification

Fritsch GmbH has been certified by the TÜV-Zertifizierungsgemeinschaft e.V.

TGA-ZM-05-08-00

An audit certified that Fritsch GmbH conforms to the requirements of the DIN EN ISO 9001:2008.

CE Conformity

The enclosed Conformity Declaration lists the guidelines the FRITSCH instrument conforms to, to be able to bear the CE mark.

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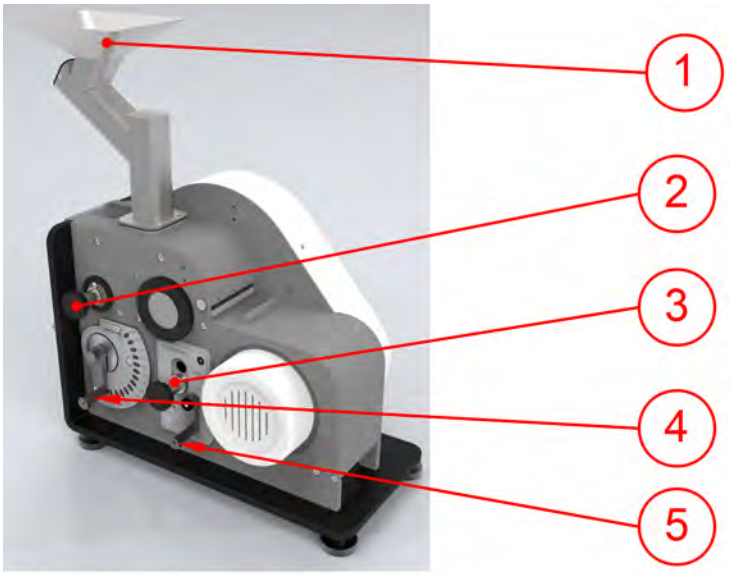
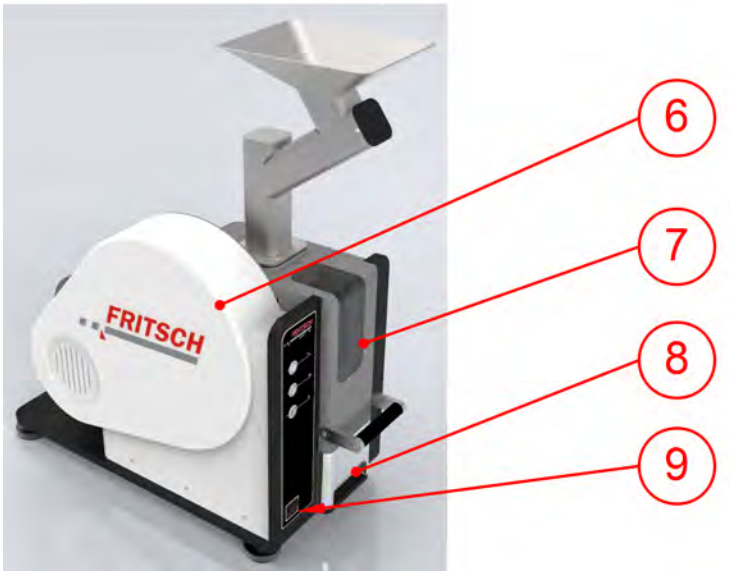
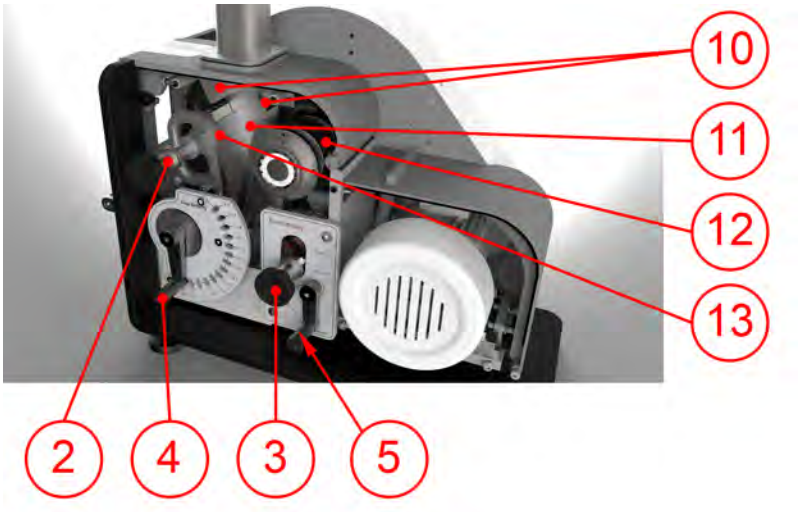
1 Basic design

In the following operating instructions, the designations mentioned below are used together with the corresponding numbers.

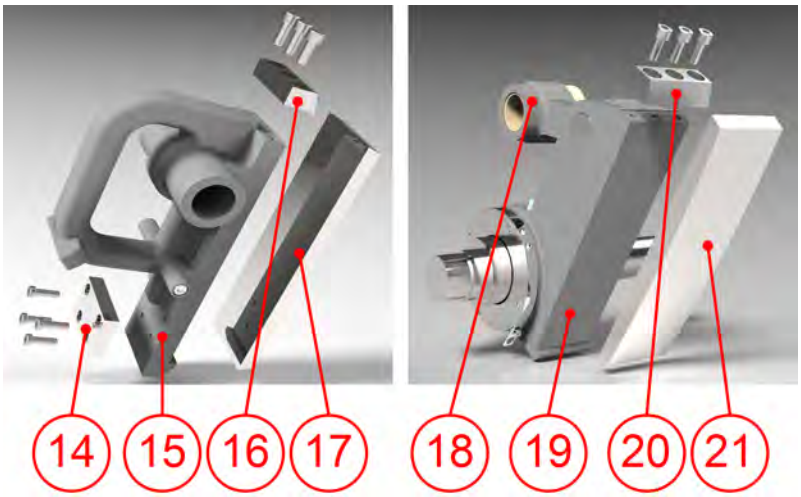




1 Funnel
2 Guide pin, fixed crushing jaw
3 Guide pin, guide plate
4 Crank, gap adjustment
5 Crank for kinematics
6 External belt guard
7 Lid
8 Source material container
9 Main switch



2 Guide pin, fixed crushing jaw
3 Guide pin, guide plate
4 Crank, gap adjustment
5 Crank for kinematics
10 Block, grinding aperture
11 Support wall (both sides)
12 Crushing jaw, movable, compl.
13 Crushing jaw, fixed, compl.



14 Pressure plate
15 Crushing jaw, fixed
16 Clamping strip
17 Crushing plate, fixed
18 Guide plate
19 Crushing jaw, movable
20 Clamping strip
21 Crushing plate, movable

2 Safety information and use

2.1 Requirements for the user

This operating manual is intended for persons assigned with operating and monitoring the Fritsch PULVERISETTE 1 premium line. The operating manual and especially its safety instructions are to be observed by all persons working on or with this device. In addition, the applicable rules and regulations for accident prevention at the installation site are to be observed. Always keep the operating manual at the installation site of the PULVERISETTE 1 premium line.

People with health problems or under the influence of medication, drugs, alcohol or exhaustion must not operate this device.

The PULVERISETTE 1 premium line may only be operated by authorised persons and serviced or repaired by trained specialists. All commissioning, maintenance and repair work may only be carried out by technically qualified personnel. Qualified personnel are persons who, because of their education, experience and training as well as their knowledge of relevant standards, regulations, accident prevention guidelines and operating conditions, are authorised by those responsible for the safety of the machine to carry out the required work and are able to recognize and avoid possible hazards as defined for skilled workers in IEC 364.

In order to prevent hazards to users, follow the instructions in this manual.

Malfunctions that impair the safety of persons, the PULVERISETTE 1 premium line or other material property must be rectified immediately. The following information serves both the personal safety of operating personnel as well as the safety of the products described and any devices connected to them: All maintenance and repair work may only be performed by technically qualified personnel.

This operating manual is not a complete technical description. Only the details required for operation and maintaining usability are described.

Fritsch has prepared and reviewed this operating manual with the greatest care. However, no guarantee is made for its completeness or accuracy.

Subject to technical modifications.

2.2 Intended use

The PULVERISETTE 1 *premium line* is a Jaw Crusher for pre-crushing hard and brittle material samples from the fields of mining and metallurgy, geology and mineralogy, the chemical, glass and ceramic industry, or rocks and soils.

The feed sizes are as follows:

for model I maximum 60 mm,

for model II maximum 95 mm,

The final fineness that can be achieved is between about 15 mm and 0.3 mm, depending on the setting.

The Jaw Crusher described here is an equipment item for applications in industrial environments.

The device may only be used for this purpose.

2.2.1 Operating principle

The materials are crushed in a crushing chamber, created by two support walls (11), an adjustable, fixed crushing plate (17) and a swinging, movable crushing plate (21). The movable crushing jaw (12) is driven by a flywheel. Due to its special motion sequence, the material to be crushed is pulled into the crushing chamber and the crushed material is protected from getting jammed. This material exits the crushing chamber through the adjustable discharge gap and is collected in the source material container (8).

2.3 Obligations of the operator

Before using the PULVERISETTE 1 premium line, this manual is to be carefully read and understood. The use of the PULVERISETTE 1 premium line requires technical knowledge; only commercial use is permitted.

The operating personnel must be familiar with the content of the operating manual. For this reason, it is very important that these persons actually receive the present operating manual. Ensure that the operating manual is always near the device.

The PULVERISETTE 1 premium line may exclusively be used within the scope of applications set down in this manual and within the framework of guidelines put forth in this manual. In case of non-compliance or improper use, the customer assumes full liability for the functional capability of the Jaw Crusher and for any damage or injury arising from failure to fulfil this obligation.

By using the PULVERISETTE 1 premium line the customer agrees with this and recognizes that defects, malfunctions or errors cannot be completely excluded. To prevent risk of damage to persons or property or of other direct or indirect damage, resulting from this or other causes, the customer must implement sufficient and comprehensive safety measures for working with the PULVERISETTE 1 premium line.

Neither compliance with this manual nor the conditions and methods used during installation, operation, use and maintenance of the PULVERISETTE 1 premium line can be monitored by Fritsch GmbH. Improper execution of the installation can result in property damage and thus endanger persons. Therefore, we assume absolutely no responsibility or liability for loss, damage or costs that result from errors at installation, improper operation or improper use or improper maintenance or are in any way connected to these.

The applicable accident prevention guidelines must be complied with.

Generally applicable legal and other obligatory regulations regarding environmental protection must be observed.

2.4 Information on hazards and symbols used in this manual

Safety information

Safety information in this manual is designated by symbols. Safety information is introduced by keywords that express the extent of the hazard.

DANGER!
This symbol and keyword combination points out a directly hazardous situation that can result in death or serious injury if not avoided.

WARNING!
This symbol and keyword combination points out a possibly hazardous situation that can result in death or serious injury if not avoided.

CAUTION!
This symbol and keyword combination points out a possibly hazardous situation that can result in slight or minor injury if not avoided.

NOTICE!
This symbol and keyword combination points out a possibly hazardous situation that can result in property damage if not avoided.

ENVIRONMENT!
This symbol and keyword combination points out a possibly hazardous situation that can result in environmental damage if not avoided.

Special safety information

To call attention to specific hazards, the following symbols are used in the safety information:

DANGER!

This symbol and keyword combination points out a directly hazardous situation due to electrical current. Ignoring information with this designation will result in serious or fatal injury.

DANGER!

This symbol and keyword combination designates contents and instructions for proper use of the machine in explosive areas or with explosive substances. Ignoring information with this designation will result in serious or fatal injury.

DANGER!

This symbol and keyword combination designates contents and instructions for proper use of the machine with combustible substances. Ignoring information with this designation will result in serious or fatal injury.

WARNING!

This symbol and keyword combination points out a directly hazardous situation due to movable parts. Ignoring information with this designation can result in hand injuries.

WARNING!

This symbol and keyword combination points out a directly hazardous situation due to hot surfaces. Ignoring information with this designation can result in serious burn injuries due to skin contact with hot surfaces.

Safety information in the procedure instructions

Safety information can refer to specific, individual procedure instructions. Such safety information is embedded in the procedure instructions so that the text can be read without interruption as the procedure is being carried out. The keywords described above are used.

Example:

1. Loosen screw.
2. **CAUTION!**
   Risk of entrapment at the lid.

   Close the lid carefully.
3. Tighten screw.

Tips and recommendations

This symbol emphasises useful tips and recommendations as wells as information for efficient operation without malfunction.

Further designations

To emphasise procedure instructions, results, lists, references and other elements, the following designations are used in this manual:

Designation	Explanation
1., 2., 3. ...	Step-by-step procedure instructions
⇨	Results of steps in the procedure
↳	References to sections in this manual and relevant documentation
■	Lists without a specific order
[Button]	Operating elements (e.g. push button, switch), display elements (e.g. signal lamps)
'Display'	Screen elements (e.g. buttons, function key assignment)

2.5 Device safety information

Please observe!

- Only use original accessories and original spare parts. Failure to observe this instruction can compromise the safety of the machine.
- Accident-proof conduct is to be strictly followed during all work.
- Comply with all currently applicable national and international accident prevention guidelines.

CAUTION!

Wear hearing protection!

If a noise level of 85 dB(A) is reached or exceeded, ear protection should be worn to prevent hearing damage.

WARNING!

The maximum accepted concentration (MAC) levels of the relevant safety guidelines must be observed; if necessary, ventilation must be provided or the machine must be operated under an extractor hood.

DANGER!

Explosion hazard!

- When grinding oxidizable substances, e.g. metals or coal, there is a risk of spontaneous combustion (dust explosion) if the share of fine particles exceeds a certain percentage. When grinding these kinds of substances, special safety measures must be taken and the work must be supervised from a specialist.
- The high-speed rotor mill is not explosion protected and is not designed to grind explosive materials.

- Do not remove the information signs.

NOTICE!

Immediately replace damaged or illegible information signs.

- Unauthorised alteration of the PULVERISETTE 1 premium line will void Fritsch's declaration of conformity to European directives and void the guarantee.
- Only use the PULVERISETTE 1 premium line when it is in proper working order, as intended and in a safety- and hazard-conscious manner adhering to the operating manual. In particular, immediately rectify any malfunctions that could pose a safety hazard.
- If, after reading the operating manual, there are still questions or problems, please do not hesitate to contact our specialised personnel.

2.6 Protective equipment

Protective equipment is to be used as intended and may not be disabled or removed.

All protective equipment is to be regularly checked for completeness and proper working order

The jaw crusher is equipped with a comprehensive safety system:

- The funnel (1) is protected against manipulation by its zigzag-shaped material guide.
- The source material container (8) must be inserted. A locking mechanism keeps it closed during operation and prevents the jaw crusher from being opened after start-up.
- The source material container (8) prevents the lid (7) from being opened during operation.
- At the same time, a sensor monitors the opening of the lid (7).

2.7 Hazardous areas

- Crushing hazard when closing the lid (7)!

2.8 Electrical safety

2.8.1 General Information

- The jaw crusher is switched on and off using the main switch (9).
  - Push the main switch (9) to the start position I → the jaw crusher is ready for operation within a few seconds.
  - After stopping the crushing process with the Stop button, the jaw crusher can be switched off with the main switch (9) in the stop position O .
- The jaw crusher has a **motor protection switch** adapted to the mains voltage (in accordance with the type plate), which is integrated in the main switch.

  In the event of an overload or a defective motor or cable, the motor protection switch automatically disconnects the unit from the power supply. After eliminating the fault, the device can be switched back on again using the main switch (9).

2.8.2 Protection against restart

In the event of a **power failure** during operation, the jaw crusher comes to a stop: this happens after about 3 seconds.

When the power supply is restored, the jaw crusher does not start up.

- The jaw crusher is secured against restarting.
- Press the Start button to continue the crushing process.

3 Technical data

3.1 Dimensions

Models I + II: 55 x 90 x 106 cm (width x depth x height)

3.2 Weight

Model I: net 305 kg, gross 340 kg

Model II: net 320 kg, gross 355 kg

3.3 Operating noise

Emissions value of workplace according to DIN EN ISO 3746:2005 LPa = 83 dB(A). The noise level measurement was conducted with the grinding stock: gravel, grain size 20-60mm.

3.4 Voltage, current consumption, power consumption

The device can be operated with the following mains voltages:

Model I:

- Single phase alternating current 115V ± 10%, 17A, 1.6kW
- Single phase alternating current 230V ± 10%, 6.5A, 1.6kW
- Three phase alternating current 230V ± 10%, 4.2A, 1.5kW
- Three phase alternating current 400V ± 10%, 2.4A, 1.5kW

Model II:

- Three phase alternating current 230V ± 10%, 10.4A, 3.5kW
- Three phase alternating current 400V ± 10%, 6.5A, 3.5kW

Transient overvoltage according to overvoltage category II permitted.

3.5 Electrical fuses

- The electrical fuse is integrated in the main switch (9).

3.6 Material

Feed size:

Model I: approx. 60 mm

Model II: approx. 95 mm

Throughput:

Model I: 140 kg/h

Model II: 250 kg/h

Depending on the set gap width.

3.7 Final fineness

The final fineness depends on the set gap width. It is between 0.3mm and 15mm.

4 Installation

WARNING!
The weight of the Jaw Crusher is as follows for

- Model I: 305 kg
- Model II: 320 kg

4.1 Transport

The device is delivered on a transport pallet with a wooden cover. We recommend using a forklift or pallet truck for transporting the packed device.

DANGER!
Do not step under the transport pallet during transport.

WARNING!
Improper lifting can lead to personal injury or property damage. The machine is only to be lifted with suitable equipment and by qualified personnel.

The guarantee excludes all claims for damage due to improper transport.

4.2 Unpacking

- Pull out the nails that fasten the cover to the transport pallet. The cover is the wooden box that has been placed over the transport pallet.
- Lift the cover off of the transport pallet.

CAUTION!
Crushing hazard!
Always lift with 2 persons.

- Compare the contents of the delivery with your order.

4.3 Set-up

DANGER!
During set-up work, do not enter the area below the raised device.

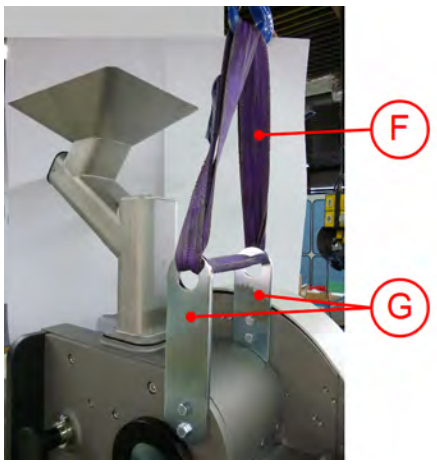
To set up the Jaw Crusher, you require a crane or other suitable transport equipment, and a carrying strap (F) (not included in the scope of delivery) with a length of at least 80cm.

NOTICE!
Note the load-bearing capacity of the carrying strap!

Tool

m Box wrench, size 16/17

NOTICE!
The lid (7) cannot be opened as long as the carrying links (G) are still mounted on the Jaw Crusher.



1. The Jaw Crusher is attached to the transport pallet from below using 3 hexagon screws. Undo the screws with the size 17mm box wrench (m)
2. Guide the carrying strap (F) through the holes of the carrying links (G).
3. Attach the carrying strap (F) to a crane or a similar device.
4. You can now move the Jaw Crusher to the desired location.

   Set down the Jaw Crusher on a flat and firm surface (the ground or a sturdy workbench). You can also screw it onto a base plate (a pallet or similar).

5. Remove the carrying strap (F) and remove the transport links (G) using the size 16mm box wrench provided (m).

4.4 Ambient conditions

WARNING!

Mains voltage!

- The device may only be operated indoors.
- The surrounding air may not carry any electrically conductive dust.
- Maximum relative humidity 80% for temperatures up to 31°C, linearly decreasing down to 50% relative humidity at 40°C.

- The room temperature has to stay between 5 - 40°C.
- Altitudes up to 2000 m
- Degree of pollution 2 according to IEC 664.

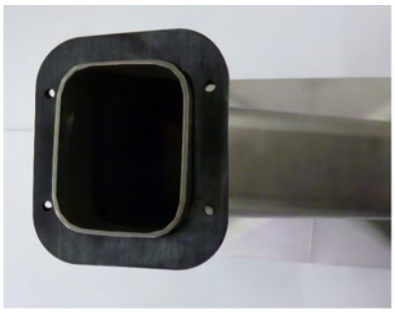
4.5 Installing the funnel (1)

The Jaw Crusher is delivered **without** funnel (1) mounted. It must be mounted prior to initial start-up.

1 Funnel
g Hex wrench (size 4)

1. Take the funnel (1) and the hex wrench also provided (g) out of the packaging.

2. Lift the rubber seal (E) off the funnel opening of the Jaw Crusher. To do this, remove the 4 countersunk head screws (D) using the hexagon socket wrench (g).



3. Fit the rubber seal (E) on the funnel neck. Pay attention to the position of the holes in the funnel (1) and the rubber seal (E). They must lie on top of each other.

4. Insert the funnel (1) in the corresponding funnel opening on the top of the Jaw Crusher.

NOTICE!
Pay attention to the funnel's installation direction. The funnel opening must face the front.

5. Attach the funnel (1) to the housing using the previously removed 4 countersunk head screws (D).

The countersunk head screws (D) must be tightened firmly in order that the rubber seal is compressed and tight.

4.6 Electrical connection

Before establishing the connection, compare the voltage and current values given on the type plate with the values of the available electrical system.

The electrical system should meet the following requirements:

- 3~ / 1~ connection
- Fuse protection of at least 16A for the socket connection
- or automatic circuit-breaker with 16A and "C" characteristic
- Functioning protective earth.

4.6.1 Rotation direction of the drive motor

The Jaw Crusher is equipped with an automatic rotation direction detection unit.

4.7 Initial start-up / function test

DANGER!
Crushing hazard!
Only put the jaw crusher into operation with the funnel (1) mounted!

Switch on the device only after all work as described in *Chapter 4 'Installation' on page 18* has been carried out!

During the first hours of operation, some grease may emerge from the eccentric bearing of the moving crushing jaw (see also *Chapter 8 'Maintenance' on page 45*). After a few hours of operation, the grease will have been distributed evenly in the anti-friction bearing chamber and no more grease emerges.

NOTICE!

Only put the jaw crusher into operation with the crushing plates (17, 21) mounted!

4.7.1 Switching on

Switch main switch (9) to I.

4.7.2 Function check

Once the grinding chamber is closed and the grinding stock container is inserted, the device can be started by the START button (26). The laboratory jaw crusher starts up. Continue with *Chapter 5 'Working with the laboratory jaw crusher' on page 24*.

4.7.3 Switching off

Press the STOP button (27) and the machine comes to a stop. Switch main switch (9) to 0. The laboratory jaw crsuher switches off completely.

5 Working with the laboratory jaw crusher

NOTICE!
In the case of the Jaw Crusher with single-phase motor, 230V and 110V, a maximum of 20 switching operations per hour are permitted!

5.1 Selecting the crushing plates and the lateral support walls

The standard version of the jaw crusher is equipped with crushing plates (17, 21) and support walls (11) made of tempered tool steel.

As a special version or for retrofitting, crushing plates and

support walls can be delivered in the following materials:

Model I		
Material	**Designation**	**Order number**
Tempered tool steel	Fixed crushing plate	43.0010.09
	Movable crushing plate	43.0020.09
	1 pair of support walls	43.4000.09
Chromium-free steel	Fixed crushing plate	43.0011.09
	Movable crushing plate	43.0021.09
	1 pair of support walls	43.4010.09
Chromium-nickel stainless steel	Fixed crushing plate	43.0030.10
	Movable crushing plate	43.0040.10
	1 pair of support walls	43.4020.10
Tungsten carbide (WC + Co)	Fixed crushing plate	43.0050.08
	Movable crushing plate	43.0060.08
	1 pair of support walls	43.4030.08
Zirconium oxide	Fixed crushing plate	43.0100.27
	Movable crushing plate	43.0110.27
	1 pair of support walls	43.4050.27
Manganese steel	Fixed crushing plate	43.0130.23
	Movable crushing plate	43.0140.23

Aluminium	1 pair of support walls	43.4040.13
POM	1 pair of support walls	43.4045.16

Model II		
Material	**Designation**	**Order number**
Tempered tool steel	Fixed crushing plate	43.3010.09
	Movable crushing plate	43.3020.09
	1 pair of support walls	43.4000.09
Chromium-free steel	Fixed crushing plate	43.3011.09
	Movable crushing plate	43.3021.09
	1 pair of support walls	43.4010.09
Chromium-nickel stainless steel	Fixed crushing plate	43.3030.10
	Movable crushing plate	43.3040.10
	1 pair of support walls	43.4020.10
Tungsten carbide (WC + Co)	Fixed crushing plate	43.3050.08
	Movable crushing plate	43.3060.08
	1 pair of support walls	43.4030.08
Zirconium oxide	Fixed crushing plate	43.3100.27
	Movable crushing plate	43.3110.27
	1 pair of support walls	43.4050.27
Manganese steel	Fixed crushing plate	43.3130.23
	Movable crushing plate	43.3140.23
Aluminium	1 pair of support walls	43.4040.13
POM	1 pair of support walls	43.4045.16

The crushing plates made of zirconium oxide are only suitable for crushing medium-hard and brittle materials (or similar). Metal may not be crushed under any circumstances.

The Cr-Ni steel equipment is recommended if damp material is crushed and this would cause the plates and walls made of tool steel to rust.

The tungsten carbide equipment is recommended for crushing very hard material or if ferrous contaminants are to be avoided.

5.2 Replacing the crushing plates (17, 21) and support walls (11)

DANGER!

Mains voltage!

– Before beginning with maintenance and assembly work, disconnect the mains plug and protect the device against being unintentionally switched back on!
– Indicate maintenance and assembly work with warning signs.

On delivery of the Jaw Crusher, a set of crushing plates (17, 21) and the support walls (11) are firmly mounted on it. The Jaw Crusher is ready for use after connecting it to the power supply.

The crushing plates (to an extremely small extent also the support walls) are subject to wear and may need to be turned and replaced at a later stage.

If you determine during the inspection or cleaning that the crushing plates are only worn at the bottom, you can simply turn over the symmetrical plates.

The fixed and movable crushing plates deviate in shape.

The fixed crushing plate (17) has plane-parallel surfaces. The movable crushing plate (21) is convex on the crushing side and slightly longer.

5.2.1 Replacing the crushing plate (17) of the fixed crushing jaw (13)

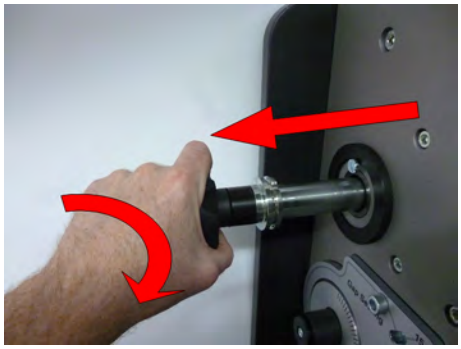
Tool

c Hex wrench - size 6

Replacement

1. Pull out the source material container (8).

2. Open the lid (7).



3. Turn the guide pin (2) in such a way that its groove is above the position screw, which provides access to the guide pin (2).
4. Then, pull the guide pin (2) out of its guide.

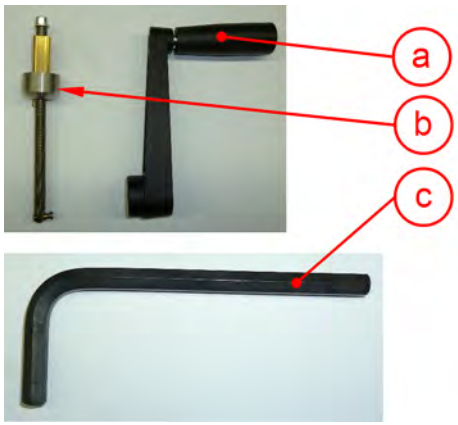
5. Lift out the crushing jaw (13) to the front.

CAUTION!
Hold the crushing jaw (13) firmly while doing this!
The part weighs about 6.2 kg.

6. Then, place the crushing jaw (13) on a firm surface and undo the cylinder-head screws of the clamping strip (16) using the hex wrench (size 6).
7. Lift off the crushing plate (17).
8. Clean all parts in order that the crushing plate has even contact during the installation.
9. Insert the replacement crushing plate or the old, turned crushing plate (17) and screw the clamping strip (16) back on again.
10. Re-install the crushing jaw (13), insert the guide pin (2) and lock it in place.
11. Close the lid (7)
12. Push in the source material container (8).

5.2.2 Replacing the crushing plate (21) of the movable crushing jaw (12)

Tools

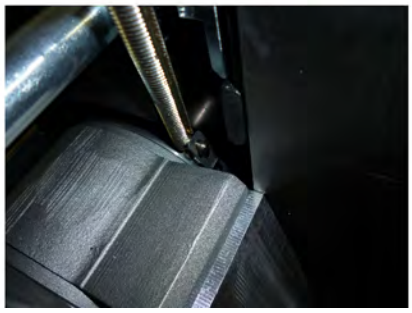


a Crank
b Threaded spindle
c Hex wrench - size 6

Replacement

NOTICE!
To replace or change the movable crushing plate (21), use the tools provided.

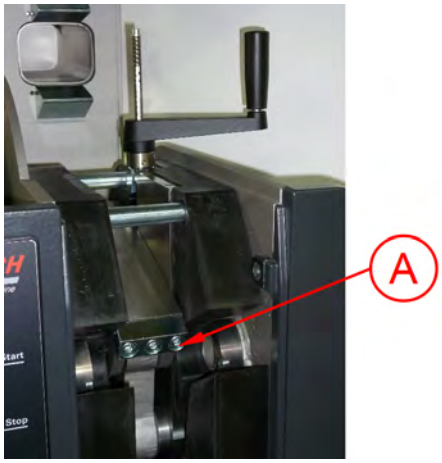
1. Pull out the source material container (8).
2. Open the lid (7).
3. Remove the fixed crushing jaw (13). See *Chapter 5.2.1 'Replacing the crushing plate (17) of the fixed crushing jaw (13)' on page 26*.
4. Turn the guide pin of the guide plate (3) in such a way that its groove is above the position screw and provides access to the guide pin (3). See also *Chapter 5.3.5 'Adjusting the guide plate' on page 37*.
5. Then, pull the guide pin (3) out of its guide. The guide plate is now no longer locked and the crushing jaw (13) can be pulled up using the special tool.



6. To do this, insert the lug of the threaded spindle (b) in the hole of the pull plate.

7. Place the threaded spindle (b) with the cone in the bearing lifting system.

8. Now push the crank (a) on to the brass square of the threaded spindle (b).



9. Turn the crank until the 3 cylinder-head screws (A) of the movable crushing jaw (12) can be accessed.
10. After undoing the 3 cylinder-head screws (A) with the hex wrench (c), you can lift off the clamping strip (20).
11. Take out the crushing plate (21).
12. Clean all parts in order that the crushing plate has even contact during the installation.
13. Insert the replacement crushing plate or the old, turned crushing plate (21) and screw the clamping strip (20) back on again.

14. Then turn the crank to move the crushing jaw (12) back into the lower position.
15. Refit the guide pin (3). See also *Chapter 5.3.5 'Adjusting the guide plate' on page 37*.
16. Remove the crank (a) and re-attach the pull plate with the threaded spindle (b) to the retaining lug.
17. Re-install the crushing jaw (13). See *Chapter 5.2.1 'Replacing the crushing plate (17) of the fixed crushing jaw (13)' on page 26*.
18. Close the lid (7).
19. Push in the source material container (8).

5.2.3 Checking the gap width

DANGER!

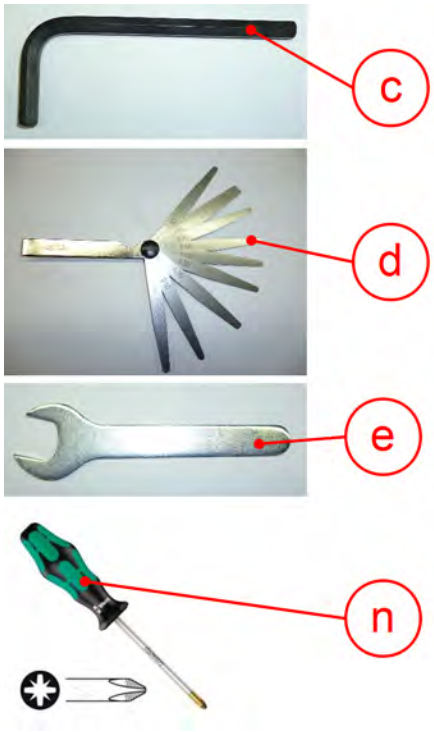
Mains voltage!

– Before beginning with maintenance and assembly work, disconnect the mains plug and protect the device against being unintentionally switched back on!
– Indicate maintenance and assembly work with warning signs.

NOTICE!

During operation of the Jaw Crusher, the crushing plates (17, 21) must not touch each other at the narrowest gap width.

Tools

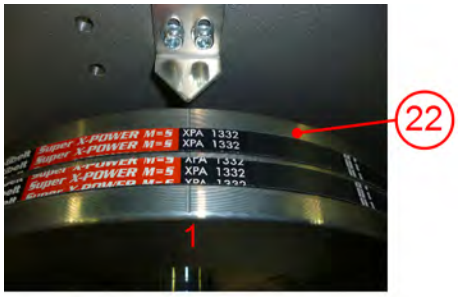


c Hex wrench - size 6
d Feeler gauge strip
e Open-ended wrench - size 19
n Cross-head screwdriver

Check

After mounting the crushing plates (17, 21), you need to check the gap width between the crushing plates.

1. Pull the source material container (8) out of the Jaw Crusher.
2. Open the lid (7).
3. Remove the 6 fastening screws of the belt guard (6) using a cross-head screwdriver (n) and lift off the belt guard (6). The flywheel (21) can be seen.
4. Use the crank (4) to set the minimum grinding gap of 0.3mm. See *Chapter 5.3.1 'Setting the gap width' on page 35*
5. Turn the flywheel (22) to position 1.



6. Undo the 2 cylinder-head screws for adjusting the grinding gap using the hex wrench (c).

7. Now guide the feeler gauge strip (d) provided, 0.3mm thick, between the two crushing jaws (12, 13).

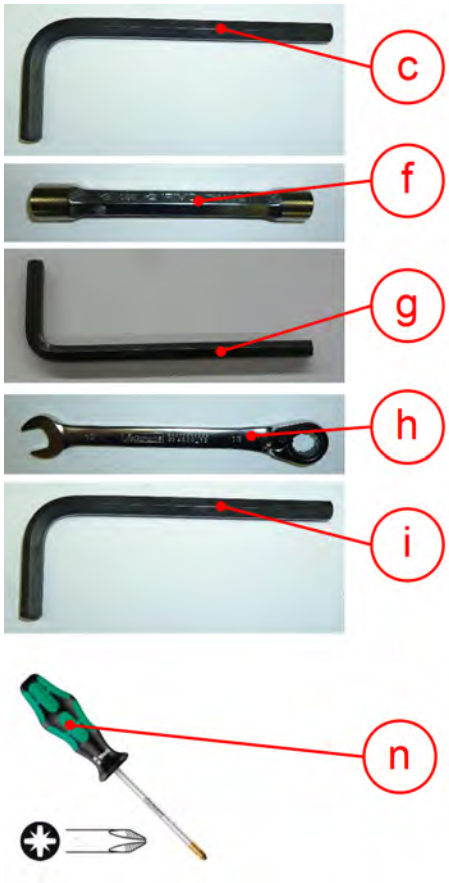
8. Use the open-ended wrench (e) to set the eccentric for adjusting the grinding gap in such a way that the feeler gauge strip (d) is clamped slightly.

9. Tighten the 2 cylinder-head screws for adjusting the grinding gap using the hex wrench (c).
10. Remove the feeler gauge strip (d) from the grinding chamber.
11. Refit the device's belt guard (6).
12. Then, close the lid (7).
13. Push in the source material container (8).

5.2.4 Replacing the support walls

It is practically only necessary to replace the support walls (11) when the crushing plates (17, 21) are replaced, because their material needs to be changed and even minimal amounts of abrasion on the support walls are to be avoided.

Tool

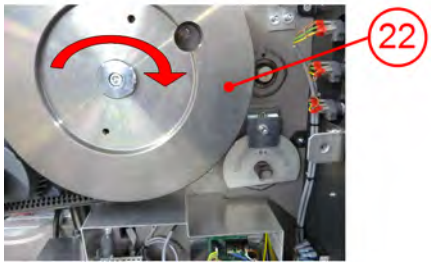


c Hex wrench - size 6
f Socket wrench - size 13
g Hex wrench - size 4
h Open-ended wrench - size 13
i Hex wrench - size 5
n Cross-head screwdriver

Replacing the left-hand support wall

1. First, lift the fixed crushing jaw (13) as described in ↬ *Chapter 5.2.1 'Replacing the crushing plate (17) of the fixed crushing jaw (13)' on page 26* out of the Jaw Crusher.
2. Then, remove the 6 fastening screws of the belt guard (6) using a cross-head screwdriver (n) and lift off the belt guard (6). The fly-wheel (22) can be seen.
3. The support wall is attached to the left-hand side wall with 5 hexagon screws. These only need to be loosened and not removed completely.

Working with the laboratory jaw crusher



4. To access the two screws behind the flywheel (22), it must be turned until the screw heads can be accessed through the hole in the flywheel.

5. Undo the two screws with the socket wrench (f)

6. You will find two more hexagon screws below the outer right edge of the flywheel (22). Undo them with an open-ended wrench (h).

7. The last hexagon screw to be undone can be accessed freely, as illustrated. Undo it with the socket wrench (f).

8. Then, lift the support wall up out of the Jaw Crusher.

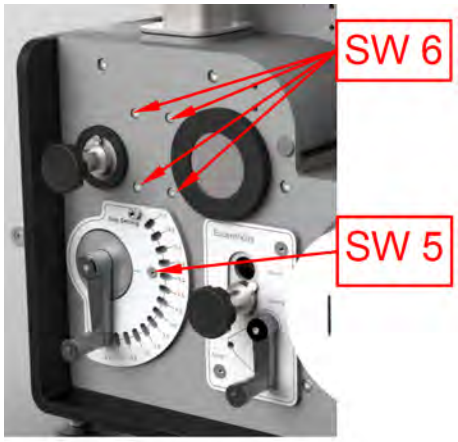
9. The support wall and the belt guard are installed in the reverse order.

WARNING!

Crushing hazard!

Do not forget to screw the belt guard (6) back in place: It is important for your safety!

Replacing the right-hand support wall



1. First, if not already done, lift the fixed crushing jaw (13) as described in *Chapter 5.2.1 'Replacing the crushing plate (17) of the fixed crushing jaw (13)' on page 26* out of the Jaw Crusher.
2. The 5 fastening screws for the right-hand support wall can be accessed directly on the right-hand side wall.
3. Undo the screws with the hex wrenches (c and i).

4. Then, lift the support wall up out of the Jaw Crusher.
5. The support wall is installed in the reverse order.

5.3 Comminution of material to be crushed

5.3.1 Setting the gap width

The opening width of the gap between the crushing plates determines the average particle size of the crushed material. You can use the crank (4) to adjust the gap in stages between approx. 0.3 mm and 15 mm.

To change the gap, pull out the knurled knob on the crank (4) and move the crank (4) to the desired position. Allow the knob to engage again correctly - this locks the fixed crushing plate in place.

You should pre-crush material that is difficult to crush (e.g. metallic alloys) in a first cycle with a wider gap.

In the second cycle, set the gap width for the desired fineness.

If you do not have any experience in the crushing capability of your material, you should carefully crush a sample in the first cycle.

5.3.2 Feeding material

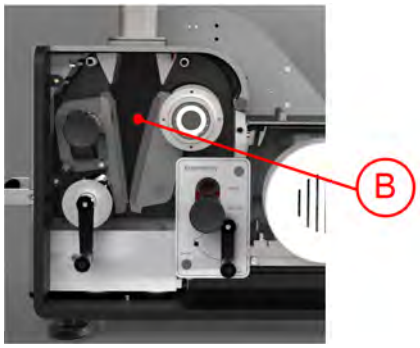
NOTICE!
Before filling the material into the funnel, switch on the device.

Feed large chunks of material

- model I, maximum edge length 60 mm,
- model II, maximum edge length 95 mm

separately to the funnel.

Do not add more material until the crushing noise has fallen significantly.



Never fill more material to be crushed into the funnel than the actual crushing chamber (B) can hold. This is limited by the upper edge of the support walls (11) and by crushing plates (17; 21).

No material may lie above these edges. During continuous operation, you may also only feed the same amount as is discharged as crushed material.

The maximum amount to be fed depends on the material's crushing capability and the selected gap width. Observe the crushing process (crushing noise) for each new material and determine the optimum amount to be fed.

5.3.3 Dust exhaust

Comminution of certain materials (e.g. coal, lumps of rock, stones) may result in the development of dust, which accumulates in the crushing chamber (B). To prevent it from spreading, the Jaw Crusher can be equipped with a dust exhaust system. See ↬ *Chapter 6.1 'Dust exhaust' on page 38*.

5.3.4 Final fineness

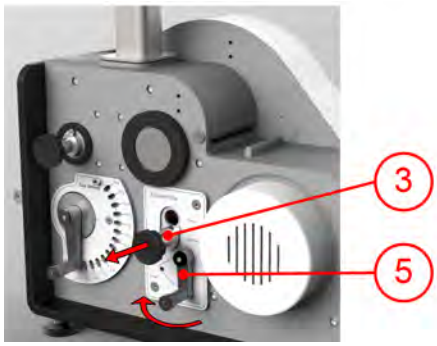
The final fineness achieved depends on the material properties and the gap setting between the two crushing plates. However, this gap width only determines one dimension of the crushed material. This means that for material crushed into plates, a second cycle can be applied to significantly reduce the proportion of long parts or parts with a large surface.

At the smallest set gap width, the average particle size (d_{50}) of the crushed material is about 2mm.

5.3.5 Adjusting the guide plate

In the standard case, the guide plate is in the "Normal" position.

However, for certain uses, it may be beneficial to reduce the opening angle of the movable crushing plate ☞ *'"Small" setting' on page 37*.



This is done as follows:

1. Turn the guide pin (3) in such a way that its groove is above the position screw providing access to the guide pin (3).
2. Then, pull the guide pin (3) out of its guide. The guide plate is now no longer locked.
3. Now, you can turn the crank (5) to move the guide plate to the "Small" position. To do this, pull out the knurled knob on the crank (4). That provides access to the crank.
4. Lock the guide plate with the guide pin (3) by pushing it into the upper hole (small) and turning it.
5. To increase the opening angle again, the guide plate must be switched back to "Normal". This is done as described above.

"Small" setting

In the "Small" position, the opening angle of the movable crushing plate is reduced, which reduces the distribution range of particle sizes and the size of the particles is more consistent. However, this setting will result in an extended throughput time.

If the samples are easy to crush, it may be beneficial to reduce the opening angle for certain uses. For crushing sticky material such as coal, this setting is not very suitable, however.

For certain materials, it is helpful to pre-crush the material with a "normal" opening angle and to re-crush the material in a second cycle with a smaller opening angle.

6 Accessories

6.1 Dust exhaust

- 43.9050.00 Dust exhaust system
- 43.9051.00 Polyester filter set (pack of 2)
- 43.9052.00 Plastic bags (pack of 5)
- 43.9055.00 Paper filter bags (pack of 5)

Assembling the dust exhaust system

DANGER!

Mains voltage!

The mains plug must be disconnected before starting installation work.

The installation work may only be carried out by authorised persons.

1. After removing the dust, insert one end of the exhaust hole in the connecting hole at the back of the Jaw Crusher. Connect the other end to the dust exhaust system.

2. Connect the control box to the back of the Jaw Crusher.

3. Then, insert the mains plug of the dust exhaust system in the control box and insert the mains plug of the control box in the socket.
4. Switch on the dust exhaust system (ON).

5. Re-connect the Jaw Crusher to the power supply and turn the main switch (9) to 1 (on).
6. The dust exhaust system can be switched on and off at the control panel (C) when the Jaw Crusher is ready for operation.

6.2 Conversion kit for iron-free pre-crushing

6.2.1 Model I

Conversion kit for iron-free pre-crushing, 01.1090.00, consisting of:

Quantity	Article number	Article designation	Material
1	01.3501.00	Coated source material container	Proco-PA 11 (Rilsan)
1	01.1101.00	Coated funnel, complete	Proco-PA 11 (Rilsan)
1	43.4045.16	One pair of support walls	POM
2	01.1531.16	Block for grinding chamber opening	POM
2	01.5420.13	Clamping strip for crushing jaw	Duralu

Additionally required:

Quantity	Article number	Article designation	Material
1	43.0100.27	Crushing plate for fixed crushing jaw	Zirconium oxide
1	43.0110.27	Crushing plate for movable crushing jaw	Zirconium oxide

6.2.2 Model II

Conversion kit for iron-free pre-crushing, 01.2090.00, consisting of:

Quantity	Article number	Article designation	Material
1	01.3501.00	Coated source material container	Proco-PA 11 (Rilsan)
1	01.2101.00	Coated funnel, complete	Proco-PA 11 (Rilsan)
1	43.4045.16	One pair of support walls	POM
2	01.2531.16	Block for grinding chamber opening	POM
2	01.7420.13	Clamping strip for crushing jaw	Duralu

Additionally required:

Quantity	Article number	Article designation	Material
1	43.3100.27	Crushing plate for fixed crushing jaw	Zirconium oxide
1	43.3110.27	Crushing plate for movable crushing jaw	Zirconium oxide

6.2.3 Converting the funnel (1)

The conversion is carried out as described in *Chapter 4.5 'Installing the funnel (1)' on page 20*

6.2.4 Converting the crushing plates (17, 21) and support walls (11)

The conversion is carried out as described in *Chapter 5.2 'Replacing the crushing plates (17, 21) and support walls (11)' on page 26*

6.2.5 Converting the grinding opening blocks (10)

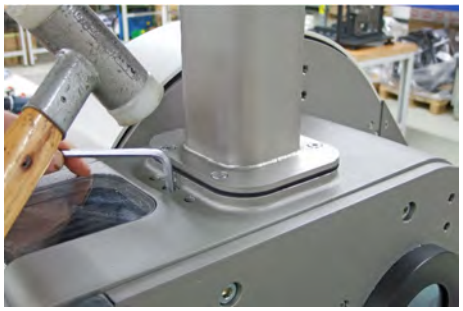
Tools

i Hex wrench - size 5
k Plastic mallet

Conversion

1. The blocks (10) are each attached to the lid (1) with one cylinder-head screw and 2 dowel pins.

2. To replace the blocks (10), undo the cylinder-head screws using a hex wrench (i). Unscrew the screws by about 5 to 10mm. Do not remove the screws completely; otherwise, the blocks will fall into the grinding chamber.



3. Now use a mallet (k) to gently knock the hex wrench (i), which is inserted in the cylinder-head screw. The block is pushed by the dowel pins and is suspended from the cylinder-head screw.

4. Open the lid (1).

5. Hold the released block firmly and unscrew the cylinder-head screw completely and replace the block.

6. To install the block, simply insert it with the dowel pins in the holes of the lid (1).

7. Then, re-attach the blocks with the cylinder-head screw to the lid (1).

6.3 Breaking and grinding in combination with the Disk Mill PULVERISETTE 13 *premium line*

To crush coarse material for subsequent use more finely than is possible with a Jaw Crusher, it is connected to the Disk Mill PULVERISETTE 13 *premium line*.

Crushing with this combination takes place in **a single cycle** with a feed size of 95 mm (or 65 mm) up to an average particle size (d_{50}) of 0.1 mm.

The Jaw Crusher is placed on a mounting rack (order no.: 43.6000.00) above the disk mill. The material pre-crushed in the Jaw Crusher slides along a special chute directly into the funnel of the disk mill.

7 Cleaning

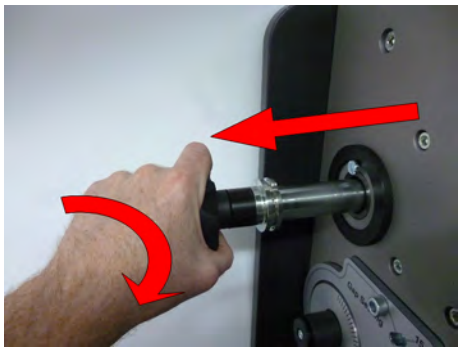
DANGER!

Mains voltage!

- Before beginning with cleaning work, disconnect the mains plug and protect the device against being unintentionally switched back on!
- Do not allow any liquids to flow into the device.
- Indicate cleaning work with warning signs.
- Put safety equipment back into operation after cleaning work.

7.1 Cleaning the grinding chamber

To access the grinding chamber, the fixed crushing jaw (12) must first be removed.



1. Pull out the source material container (8).
2. Open the lid (7).
3. Turn the guide pin (2) in such a way that its groove is above the position screw, which provides access to the guide pin (2).
4. Then, pull the guide pin (2) out of its guide.

5. Lift out the fixed crushing jaw (13) to the front.

CAUTION!

Hold the crushing jaw (13) firmly while doing this!

The part weighs about 6.2 kg.

6. You can remove dust from the grinding chamber using a dust exhaust system and a brush or by blowing it clear with compressed air (pay attention to crushed material flying around). Stubborn deposits can be removed using a steel brush. Then wipe the grinding chamber with a damp cloth and rub it down with alcohol (protection against corrosion).
7. After cleaning, re-insert the crushing jaw (13), insert the guide pin (2) and lock it in place.

8. Close the lid (7)
9. Push in the source material container (8).

8 Maintenance

DANGER!

Mains voltage!

- Maintenance work may only be performed by specialised personnel.
- Before beginning with maintenance work, unplug the mains plug and protect the device against being unintentionally switched back on.
- Put safety equipment back into operation after maintenance work.
- Indicate maintenance work with warning signs.

We recommend keeping a safety logbook Chapter 11 'Safety logbook' on page 52, where all work (maintenance, repairs.....) performed on the device is entered.

- *The most important element of maintenance is regular cleaning:*
- *When cleaning the complete device, adhere to the guidelines of the Accident Prevention Regulation (BGV A3) - especially if the device has been set up in a dusty environment or if the processed source material produces dust.*

8.1 Crushing plates

The crushing plates will get worn after a certain time, depending on the material to be crushed. Check their surfaces at regular intervals. To turn or change the plates, observe the instructions at *Chapter 5.2 'Replacing the crushing plates (17, 21) and support walls (11)' on page 26*.

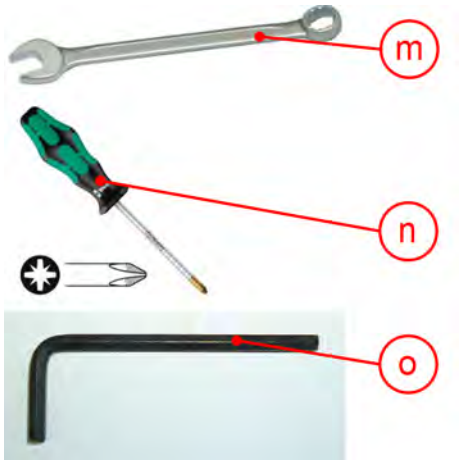
8.2 V-belt

It is normally not necessary to re-tension the V-belt. However, if you detect that the belt is squeaking or the device's throughput rate is reduced, re-tensioning or a replacement may be required.

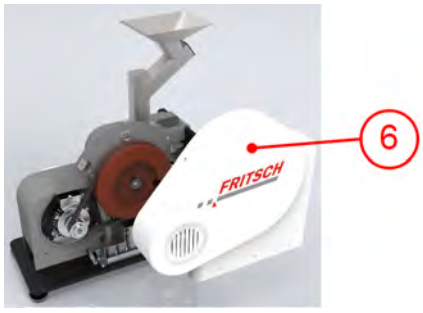
Depending on the load placed on the device, the V-belt needs to be checked for wear at regular intervals and replaced, if necessary.

8.2.1 Replacing the V-belt

Tools

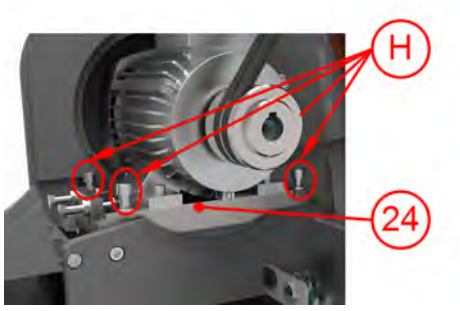


m Open-ended wrench - size 17
n Cross-head screwdriver
o Hex wrench - size 10



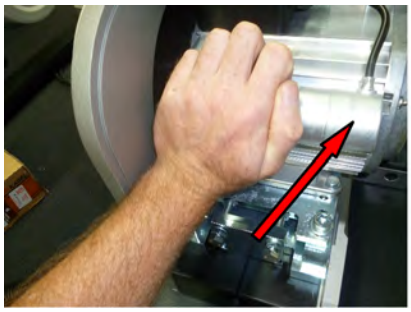
1. Remove the 6 fastening screws from the belt guard (6) using the screwdriver (n), lift it off and place it to the side.

2. Undo the screw for the motor cover (23) using the screwdriver (n) and open it.

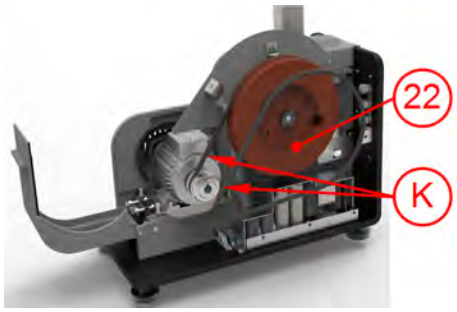


3. Use the hex wrench to undo the 4 cylinder-head screws (H) on the motor's adapter plate (24).

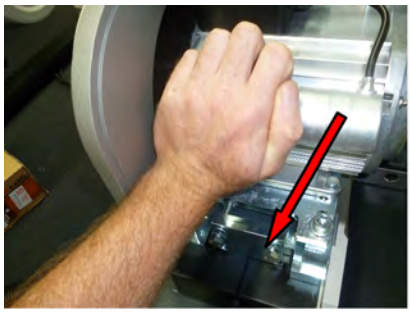
4. Turn back the 2 lock nuts (I) of the belt tensioner (25) completely using the open-ended wrench.



5. Now, push the motor forwards towards the grinding chamber.



6. The V-belts (K) can now be removed from or placed on the fly-wheel (22).



7. The V-belts (K) are tensioned by pulling the motor backwards again and turning the lock nuts (I) against the belt tensioner (25). The V-belts (K) must be tensioned evenly. This is done by alternately tightening the lock nuts (I) against the belt tensioner (25).

8. If the belt tension is sufficient, re-tighten the 4 cylinder-head screws (H) on the motor's adapter plate (24).

9. Refit the belt guard (6).

8.3 Lubricating the bearings

You should clean the guide pins (2,3) roughly after every 500 hours of use and rub them down with machine oil.

9 Guarantee terms

Guarantee period

As manufacturer, FRITSCH GmbH provides – above and beyond any guarantee claims against the seller – a guaranty valid for the duration of two years from the date of issue of the guarantee certificate supplied with the device.

Within this guarantee period, we shall remedy all deficiencies due to material or manufacturing defects free of charge. Rectification may take the form of either repair or replacement of the device, at our sole discretion. The guarantee may be redeemed in all countries in which this FRITSCH device is sold with our authorisation.

Conditions for claims against the guarantee

This guarantee is subject to the condition that the device is operated according to the instructions for use / operating manual and its intended use.

Claims against the guarantee must include presentation of the original receipt, stating the date of purchase and name of the dealer, together with the complete device type and serial number.

For this guarantee to take effect, the answer card entitled "Securing of Guarantee" (enclosed with the device) must be properly filled out and despatched without delay after receipt of the device and be received by us within three weeks or alternatively, *online registration* must be carried out with the above-mentioned information.

Reasons for loss of the guarantee

The guarantee will not be granted in cases where:

- Damage has arisen due to normal wear and tear, especially for wear parts, such as: Crushing jaws, support walls, grinding bowls, grinding balls, sieve plates, brush strips, grinding sets, grinding disks, rotors, sieve rings, pin inserts, conversion kits, sieve inserts, bottom sieves, grinding inserts, cutting tools, sieve cassettes, sieve and measuring cell glasses.
- Repairs, adaptations or modifications were made to the device by unauthorized persons or companies.
- The device was not used in a laboratory environment and/or has been used in continuous operation.
- Damage is present due to external factors (lightning, water, fire or similar) or improper handling.
- Damage is present that only insubstantially affects the value or proper functioning of the device.
- The device type or serial number on the device has been changed, deleted, removed or in any other way rendered illegible
- The above-mentioned documents have been changed in any way or rendered illegible.

Costs not covered by the guarantee

This guarantee excludes any costs for transport, packaging or travel that accrue in the event the product must be sent to us or in the event that one of our specialist technicians is required to come to your site. Any servicing done by persons not authorised by us and any use of parts that are not original FRITSCH accessories and spare parts will void the guarantee.

Further information about the guarantee

The guarantee period will neither extend nor will a new period of guarantee begin in the event that a claim is placed against the guarantee.

Please provide a detailed description of the type of error or the complaint. If no error description is enclosed, we shall interpret the shipment as an assignment to remedy all recognisable errors or faults, including those not covered by the guarantee. Errors or faults not covered by the guarantee shall in this case be rectified at cost.

We recommend reading the operating manual before contacting us or your dealer, in order to avoid unnecessary inconvenience.

Ownership of defective parts is transferred to us with the delivery of the replacement part; the defective part shall be returned to us at buyer's expense.

NOTICE!

Please note that in the event that the device must be returned, the device must be shipped in the original Fritsch packaging. Fritsch GmbH denies all liability for any damage due to improper packaging (packaging not from Fritsch).

Any enquiries must include a reference to the serial number imprinted on the type plate.

10 Exclusion of liability

Before using the product, be sure to have read and understood this operating manual.

The use of the product requires technical knowledge; only commercial use is permitted.

The product may be used exclusively within the scope of applications set down in this operating manual and within the framework of guidelines put forth in this operating manual and must be subject to regular maintenance. In case of non-compliance, improper use or improper maintenance, the customer assumes full liability for the functional capability of the product and for damage or injury arising from violating these obligations.

The contents of this operating manual are subject in entirety to copyright law. This operating manual and its contents may not be copied, further distributed or stored in any form, in part or in whole, without the prior written consent of Fritsch.

This operating manual has been prepared to the best of our knowledge and checked for accuracy at the time of printing. FRITSCH GMBH assumes no guarantee or liability whatsoever for the accuracy or completeness of the contents of this operating manual, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, unless liability is expressly prescribed by applicable laws or jurisprudence.

FRITSCH GMBH expressly reserves the right to modify and/or update this operating manual without prior notice. The same applies to modifications and improvements to the products described in this operating manual. It is the responsibility of the user to ensure that they have the current version of this operating manual. For more information, please contact your local FRITSCH GMBH distributor or Fritsch GmbH, Industriestr. 8, D-55473 Idar-Oberstein.

Not all parts shown here are necessarily installed in the product. The buyer is not entitled to delivery of these parts. If interested, please contact your local FRITSCH GMBH distributor or Fritsch GmbH, Industriestr. 8, D-55743 Idar-Oberstein.

FRITSCH GMBH takes the greatest care to ensure that the quality, reliability and safety of your products are continuously improved and adapted to the state of the art. The supplied products as well as this operating manual conform to the current state of the art when they leave the sphere of influence of FRITSCH GMBH.

By using the product the customer agrees with this and recognizes that defects, malfunctions or errors cannot be completely excluded. To prevent risk of damage to persons or property or of other direct or indirect damage, resulting from this or other causes, the customer must implement sufficient and comprehensive safety measures for working with the product.

Fritsch GmbH excludes any liability, warranty, or other obligation to compensate for damages, regardless of whether this liability, warranty, or other obligation is explicit or implicit, contractual or arising from unlawful acts or prescribed contractually, by law, or otherwise. In no event shall the buyer be entitled to any compensation from Fritsch GmbH for any special, direct, indirect, coincidental or consequential damage, including but not limited to lost profits, lost savings, lost sales or financial loss of any kind or for compensation of third parties, for downtimes, for lost goodwill, for damage to or replacement of equipment and property, for costs or restoration of materials or goods related to the product or the use of our products, for other damage or injury to persons (including fatal injuries) or similar. The above exclusion of liability is limited by mandatory liability as prescribed by laws or jurisprudence. Liability for negligence is excluded in all cases.

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Neither compliance with this operating manual nor the conditions and methods used during installation, operation, use and maintenance of the product can be monitored by Fritsch GmbH. Improper execution of the installation can result in property damage and thus endanger persons. Therefore, we assume absolutely no responsibility or liability for loss, damage or costs that result from errors at installation, improper operation or improper use or improper maintenance or are in any way connected to these.

11 Safety logbook

Date	Maintenance / Repair	Name	Signature

Date	Maintenance / Repair	Name	Signature

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